AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended) A remote sensor comprising:

a first optical path and a second optical path;

light collecting optics configured to collect light or other radiation to be transmitted along said first and second optical paths;

a sample filter assembly positioned in said first optical path after said light collecting optics;

a sample detector assembly positioned in said first optical path after said sample filter assembly, and a reference detector assembly positioned in said second optical path after said light collecting optics;

a reference filter assembly positioned in said second optical path between said light collecting optics and said reference detector assembly; and

a detector output comparison device.

2. (currently amended) The remote sensor of claim 1, ~~further comprising a reference filter assembly positioned in said second optical path between said light collecting optics and said reference detector, and~~ wherein:

said sample filter assembly comprises a bandpass filter and provides a sample output; ~~and~~

said reference filter assembly comprises a bandpass filter and provides a reference output; and

said detector output comparison device comprises noise cancellation circuitry.

3. (currently amended) The remote sensor of claim 2, wherein:

said sample ~~bandpass~~ filter is configured to transmit at a frequency that coincides with a spectral line of a target species, said frequency also coinciding with a first spectral line of a non-target species; and

said reference ~~bandpass~~ filter is configured to transmit at a frequency that coincides with said first spectral line of said non-target species, or a second spectral line of said non-target species, and which provides a magnitude of absorption or emission of said non-target species that is the same as, or comparable in magnitude to, the magnitude of absorption or emission of said non-target species provided by said frequency of said sample ~~bandpass~~ filter.

4. (currently amended) The remote sensor of claim 3, wherein said reference ~~bandpass~~ filter is configured to transmit at a frequency that coincides with a spectral line of a dust, aerosol, or atmospheric gas that is selected from the group consisting of H_2O, CO_2, O_3, N_2O, NO_x, and CO gases.

5. (original) The remote sensor of claim 3, wherein said target species is selected from the group consisting of CO_2, O_3, hydrocarbons, N_2O, NO_x, CO, pesticides, chemical warfare agents, plasmas, electrical discharges, OH, and solid or liquid interfaces.

6. (original) The remote sensor of claim 3, wherein a bandpass filter assembly is positioned in said first and second optical paths before said sample and reference detector assemblies to reduce background radiation passed by said sample and reference filter assemblies.

7. (original) The remote sensor of claim 2, wherein said sample filter assembly comprises a first striped filter comprising a repeating sequence of a plurality of filters, and said reference filter assembly comprises a second striped filter comprising a repeating sequence of a plurality of filters.

8. (original) The remote sensor of claim 7, wherein said plurality of filters of said first striped filter comprise are in the form of concentric circles.

9. (original) The remote sensor of claim 7, wherein said plurality of filters of said first striped filter and said plurality of filters of said second striped filter comprise a plurality of matched filter pairs, and said sample and reference detector assemblies comprise a plurality of detector pairs corresponding to said plurality of matched filter pairs.

10. (original) The remote sensor of claim 1, wherein said sample filter assembly comprises a notch filter and provides a sample output.

11. (original) The remote sensor of claim 10, further comprising a reference filter assembly positioned in said second optical path between said light collecting optics and said reference detector, said reference filter assembly comprising a notch filter and providing a reference output, wherein said detector output comparison device compares said sample and reference outputs.

12. (original) The remote sensor of claim 10, further comprising a blank positioned in said second optical path between said light collecting optics and said reference detector assembly.

13. (currently amended) The remote sensor of claim 12, further comprising a bandpass filter positioned in said first optical path before said sample ~~notch~~ filter, said bandpass filter having a frequency center that coincides with said attenuation frequency of said sample ~~notch~~ filter.

14. (original) The remote sensor of claim 13, wherein said sample filter assembly comprises a striped filter comprising a repeating sequence of a plurality of filters.

15. (original) The remote sensor of claim 1, wherein said remote sensor is configured for use as a handheld remote sensor.

16. (original) The remote sensor of claim 15, wherein said handheld device has the shape of a gun.

17. (original) The remote sensor of claim 15, wherein said handheld device is configured as a camera.

18. (original) The remote sensor of claim 1, wherein said remote sensor is configured for unattended operation.

19. (original) The remote sensor of claim 1, wherein said remote sensor is configured for operation in a remotely piloted vehicle.

20. (original) A remote sensor comprising:

a first optical path and a second optical path;

light collecting optics configured to collect light or other radiation;

a first beam splitter configured to transmit a first portion of the light or other radiation along a first optical path and to reflect a second portion of the light or other radiation along a second optical path;

a sample filter assembly positioned in said first optical path after said first beam splitter;

a detector assembly positioned after said sample filter assembly;

means for directing said first and second portions of the light or other radiation to said detector assembly, said detector assembly being configured to detect a sample signal when said first portion of the light or other radiation reaches said detector assembly and to detect a reference signal when said second portion of the light or other radiation reaches said detector assembly; and

a detector output comparison device positioned after said detector assembly.

21. (original) The remote sensor of claim 20, wherein said detector output comparison device subtracts and normalizes said sample and reference signals.

22. (original) The remote sensor of claim 21, wherein said detector assembly comprises two detectors.

23. (original) The remote sensor of claim 22, wherein said detector output comparison device comprises a digital computer.

24. (original) The remote sensor of claim 20, further comprising a reference filter assembly, and wherein:

said sample filter assembly comprises a bandpass filter and provides a sample output signal; and

said reference filter assembly comprises a bandpass filter and provides a reference output signal;

wherein said detector output comparison device compares said sample and reference output signals.

25. (currently amended) The remote sensor of claim 24, wherein:

said sample filter assembly is configured to transmit at a frequency that coincides with a spectral line of a target species, said frequency also coinciding with a first spectral line of a non-target species;

said reference ~~bandpass~~ filter assembly is configured to transmit at a frequency that coincides with said first spectral line of said non-target species, or a second spectral line of said non-target species, and which provides a magnitude of absorption or emission of said non-target species that is the same as, or comparable in magnitude to, the magnitude of absorption or emission of said non-target species provided by said frequency of said sample ~~bandpass~~ filter assembly~~.~~: and

wherein said detector output comparison device subtracts said sample output signal and said reference output signal to minimize effects of said background radiation.

26. (currently amended) The remote sensor of claim 24, wherein said reference ~~bandpass~~ filter is configured to transmit at a frequency that coincides with a spectral line of a dust, aerosol, or atmospheric gas that is selected from the group consisting of H_2O, CO_2, O_3, N_2O, NO_x, and CO gases.

27. (original) The remote sensor of claim 24, wherein said target species is selected from the group consisting of CO_2, O_3, hydrocarbons, N_2O, NO_x, CO, pesticides, chemical warfare agents, plasmas, electrical discharges, OH, and solid or liquid interfaces.

28. (original) The remote sensor of claim 24, wherein a bandpass filter assembly is positioned in said first and second optical paths before said detector assembly to reduce background radiation passed by said sample and reference filter assemblies.

29. (original) The remote sensor of claim 24, wherein said sample filter assembly comprises a first striped filter comprising a repeating sequence of a plurality of

filters, and said reference filter assembly comprises a second striped filter comprising a repeating sequence of a plurality of filters.

30. (original) The remote sensor of claim 29, wherein said detector assembly comprises a linear array of detectors.

31. (original) The remote sensor of claim 29, wherein said detector assembly comprises a two dimensional array of detectors.

32. (original) The remote sensor of claim 24, wherein said sample filter assembly comprises a plurality of bandpass filters and said reference filter assembly comprises a plurality of bandpass filters.

33. (original) The remote sensor of claim 20, wherein said sample filter assembly comprises a notch filter and provides a sample output signal.

34. (original) The remote sensor of claim 33, further comprising a reference filter assembly positioned in said second optical path between said light collecting optics and said detector assembly, said reference filter assembly comprising a notch filter and providing a reference output signal, wherein said detector output comparison device compares said sample and reference output signals.

35. (original) The remote sensor of claim 33, wherein a bandpass filter assembly is positioned before said sample and reference detector assemblies to reduce background radiation passed by said sample and reference filter assemblies.

36. (original) The remote sensor of claim 20, further comprising a blank positioned in said second optical path between said light collecting optics and said detector assembly.

37. (original) The remote sensor of claim 33, wherein said sample filter assembly comprises a striped filter comprising a repeating sequence of a plurality of filters.

38. (original) The remote sensor of claim 33, wherein said sample filter assembly comprises a plurality of notch filters.

39. (original) The remote sensor of claim 33, wherein said remote sensor is configured as binoculars.

40. (original) The remote sensor of claim 33, wherein said remote sensor is configured as a headset.

41. (original) The remote sensor of claim 33, wherein said remote sensor is configured for operation in an aircraft.

42. (original) The remote sensor of claim 20, wherein said detector assembly comprises a single detector, and said means for directing the first and second portions of the light or other radiation to said detector assembly comprises a means for alternately directing the first and second portions of the light or other radiation to said single detector.

43. (original) The remote sensor of claim 42, wherein said means for directing the first and second portions of the light or other radiation to said detector assembly further comprises a mechanical switching device.

44. (original) The remote sensor of claim 43, wherein said mechanical switching device comprises a slotted chopper wheel device.

45. (original) The remote sensor of claim 43, wherein said mechanical switching device comprises a mechanical shutter device.

46. (original) The remote sensor of claim 42, wherein said means for directing the first and second portions of the light or other radiation to said detector assembly further comprises a first mirror positioned in said first optical path after said sample filter assembly, and a second mirror positioned in said second optical path after said reference filter assembly, said first and second mirrors being positioned to direct the first and second portions of the light or other radiation to a second beam splitter, said second beam splitter being configured to recombine the first and second portions of the light or other radiation.

47. (original) The remote sensor of claim 20, wherein said detector assembly comprises a detector selected from the group consisting of infrared detectors, infrared focal plane arrays, photo-diodes, avalanche-photo-diodes, photomultiplier tubes, semiconductor detectors, thermal detectors, charge-coupled devices, linear-diode arrays, and linear-detector arrays.

48. (original) The remote sensor of claim 20, wherein said detector assembly comprises a focal plane array.

49. (original) The remote sensor of claim 20, wherein said light collecting optics comprise a holographic lens.

50. (original) The remote sensor of claim 20, wherein said memory device comprises a computer.

51. (original) The remote sensor of claim 20, wherein said sensor is capable of operating on a 12 volt DC power supply.

52. (original) A method of determining the presence of a target species, said method comprising:

receiving light or other radiation that has been absorbed by, or that has been emitted from, a target species;

directing a first portion of said light or other radiation through a sample filter assembly, and directing a second portion of said light or other radiation through a reference filter assembly;

directing said first portion from said sample filter assembly to a detector assembly, and directing said second portion from said sample filter assembly to said detector assembly;

detecting the power of said first portion of said filtered light or other radiation and the power of said second portion of said filtered light or other radiation using said detector assembly; and

comparing and normalizing said sample signal to said reference signal to produce a signal which is indicative of the absorption or emission of said light or other radiation by the target species.

53. (original) The method of claim 52, wherein said step of receiving light or other radiation comprises receiving light from an artificial light source.

54. (original) The method of claim 52, wherein said step of directing said first portion of said light or other radiation through a sample filter assembly, and directing said second portion of said light or other radiation through a reference filter assembly, comprises:

directing said first portion of said light or other radiation through a sample bandpass filter configured to transmit at a frequency that coincides with a first spectral line of the target species, said frequency also coinciding with a first spectral line of a non-target species; and

directing said second portion of said light or other radiation through a reference bandpass filter configured to transmit at a frequency that coincides with said first spectral line of said non-target species, or a second spectral line of said non-target species, and which provides a magnitude of absorption or emission of said non-target species that is the same as, or comparable in magnitude to, the magnitude of absorption or emission of said non-target species provided by said frequency of said sample bandpass filter.

55. (original) The method of claim 54, wherein said step of directing said second portion of said light or other radiation through a reference bandpass filter configured to transmit at a frequency that coincides with a spectral line of a non-target species comprises directing said second portion of said light or other radiation through a reference bandpass filter configured to transmit at a frequency that coincides with a spectral line of an atmospheric gas that is selected from the group consisting of H_2O, CO_2, O_3, N_2O, NO_x, and CO gases.

56. (original) The method of claim 54, wherein said step of receiving light or other radiation that has been absorbed by, or that has been emitted from, a target species, comprises receiving light or other radiation that has been absorbed by, or that has been emitted from, a target species selected from the group consisting of CO_2, O_3,

hydrocarbons, N_2O, NO_x, CO, pesticides, chemical warfare agents, plasmas, electrical discharges, OH, and solid or liquid interfaces.

57. (original) The method of claim 52, wherein said step of directing said first portion of said light or other radiation through a sample filter assembly, and directing said second portion of said light or other radiation through a reference filter assembly, comprises directing said first portion of said light or other radiation through a notch filter configured to attenuate at a frequency that coincides with a spectral line of the target species, and directing said second portion of said light or other radiation through a notch filter configured to provide no attenuation.

58. (original) The method of claim 52, wherein said step of directing a first portion of said light or other radiation through a sample filter assembly, and directing a second portion of said light or other radiation through a reference filter assembly, comprises splitting said light or other radiation into a first portion and a second portion and directing said first portion along a first optical path and said second portion along a second optical path.

59. (original) The method of claim 58, wherein said step of directing said first portion of said filtered light or other radiation to said detector assembly comprises using a switching device which selectively permits said first portion to reach said detector assembly while preventing said second portion of said filtered light or other radiation from reaching said detector assembly.

60. (original) The method of claim 59, wherein said step of directing said first portion of said filtered light or other radiation to said detector assembly comprises using a switching device, comprises using a mechanical shutter device.

61. (original) The method of claim 59, wherein said step of directing said first portion of said filtered light or other radiation to said detector assembly comprises using a switching device, comprises using a slotted chopper wheel device.

62. (new) The remote sensor of claim 10, wherein said reference filter assembly comprises a blank.